SPECIAL FOR HOME GARDENERS AND COMMERCIAL GROWERS

VOL. 2 NO. 5

AGRICULTURAL NEWS LETTER

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Issued by du Pont Company,
Wilmington, Delaware,
F. J. BYRNE, EDITOR.

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Home gardeners and commercial growers know that eternal vigilance is the price paid for good crops, either of flowers or vegetables.

Not only is it necessary to treat the soils in which the plants grow, but the plants themselves must be protected from disease, especially in their early stages of growth. After they begin to grow, they are the objectives of hordes of insect enemies.

Man has made strenuous efforts to save his crops, and therefore, himself from extinction, by waging an incessant war on these insect enemies.

Chemical laboratories are his principal sources of supply for munitions of war in this continuing battle against insects and against diseases which menace important crops.

Great progress has been made in devising chemical defences against flower and crop diseases and against insect enemies. It is possible to control many of these diseases and many of these insects. The work done in commercial laboratories, in agricultural experiment stations, and by agricultural experts in the employ of states and the Federal government, have established certain effective defences.

The du Pont Company is in the forefront in this effort to control crop diseases and insects. Not only are its laboratories continuously engaged in the effort to produce new and better insecticides, but its field men, holders of its scholarships, and its research staffs are applying the new products and watching results. In addition, it is in contact with state and government officials and commercial growers, who are engaged in the same work.

In the following pages certain phases of this fight against plant diseases and insect enemies are discussed. The results of products produced by the du Pont group are set forth.

Data is given on:

(1) - The need for having the soil free from fungi which causes disease of seedlings.

(2) - How to treat the seeds so that they will give best results.

(3) - After the seeds are growing, in a healthy condition, how to protect the plants from insect enemies, giving data on a few of the most destructive.

HOW TO PREVENT DAMPING-OFF OF SEEDLINGS, SEEDS AND CUTTINGS

Home gardeners as well as those who grow flowers or vegetables for commercial purposes are familiar with damping-off, a disease of seedlings, caused by soil-borne fungi.

Modern practice eliminates the conditions which breed damping-off by soil treatment.

A late development in the treatment of soil to prevent damping-off is the production of a material known as P. A. C. Formaldehyde dust. This has been made available by the New Products Division of the Grasselli Chemical Co. of Cleveland, Ohio. It contains six per cent P. A. C. Formaldehyde and it contains as the inert carrier, a special absorbent, alkaline, diatomaceous earth.

Extensive experiments before this dust was announced show that the proper way to treat soils with it is to spread it finely over the soil in flats, beds, benches and so forth (1½ ounces per square foot of soil). It should then be thoroughly worked into the first two or three inches of soil with a rake or hoe. If the soil is to be treated before placing it in pots, flats, benches or beds, experience has shown that the best way to do this is to thoroughly mix eight ounces of the formaldehyde dust per bushel of soil or six ounces per cubic foot of soil. After treatment most vegetable or flower seeds should be planted immediately and then thoroughly watered.

Damping-off is responsible for a very high mortality in seedlings. Poor germination of seeds often occurs and may be caused by fungi usually associated with damping-off. All of these occurrences are a source of trouble to growers and result in loss of time and labor not to speak of crop losses.

The experiments conducted with P. A. C. Formaldehyde Dust show that there can be obtained a higher percentage of germination, better stands of seedlings, and healthier and thriftier root systems.

Instructions for further use of this dust can be obtained by writing to
New Products Division,
Grasselli Chemical Co.,
Cleveland, Ohio.

The Formaldehyde dust described in the preceeding page will be found useful for greenhouse vegetable growers in their treatment of the seed beds which they will prepare in July for seedlings to produce fall vegetables.

It will also be found useful to greens keepers of golf courses for the purpose of treating screened compost soil.

WHEN DISEASE ATTACKS YOUR FLOWERS

Some grow flowers as a business and others as a hobby. In both cases, florists and amateur gardeners have sown their seeds first and fought their seed-borne diseases afterwards. Flower failures have been attributed to many causes but scientific investigations over the past ten years have definitely proved that bacteria and fungi are generally the cause of diseases which are properly known as blights, rots and wilts.

What causes these diseases?

It is now recognized that seeds are constantly exposed to attacks by numerous bacteria and fungi. They occur on the seed or in the soil. Some of these disease organisms decay the seeds and reduce their vitality. Others prey on the growing or maturing plants and frequently destroy them or prevent the bearing of normal, healthy, blooms.

A great deal of research has been done by scientists in order to find the proper material suitable for seed disinfection. Today, there are available what are known as the organic mercury compounds. One of these, known as Semesan, manufactured by the Bayer-Semesan Co., has been widely used with good results.

Its principal ingredient is hydroxymerichlorophenol and Semesan is therefore frequently referred to as chlorophenol mercury. It is extremely toxic to many disease organisms but is harmless to delicate seeds, as well as the user, when applied as recommended.

Its use has been found successful for such a wide range of flowers as asters, bachelor's buttons, calendulas, carnations, pansy, perennials, phlox, poinsettia, snap dragons, sweet peas, zinnias, anemones, iris, lilies, narcissus and tulips.

The product has also been found to be of value in combating diseases which attack golf greens and fine lawns, one of which is known as brown patch.

In addition to successful work being done by many commercial growers, a great deal of investigation and successful experimentation with this product has been done by state experiment stations. Successful results with it have been achieved at Michigan State College by Alex Laurie; at the Mississippi Agricultural Experiment Station (See circular No. 79); by the Delaware State Board of Agriculture (see quarterly bulletin, Vol. 18, No .1); at the University of Maryland by H. A. Hunter, and by the U. S. Department of Agriculture for the control of crown gall on apple grafts (see circular No. 376).

There are three important insects which do great damage to gardens and crops. These are the blister beetles, Mexican bean beetles and striped cucumber beetles.

During the last few years, Dr. Harry F. Dietz has done successful work in showing how to control these insects. Dr. Dietz is a member of the research department of the Grasselli Chemical Company, Cleveland, Ohio, a du Pont Company subsidiary. He has had long experience in the study and control of insects, having worked in this connection with the State Entomologist of Indiana on insect control and with the U. S. Department of Agriculture and the Department of Conservation of Indiana on inspection and insect control. He did insecticide investigation at the Ohio State Agricultural Experiment Station, Wooster, Ohio, for the Crop Protection Institute. He was also the holder of a Grasselli Fellowship and worked at the Ohio Agricultural Experiment Station on insecticide investigation while holding the Fellowship. His special work is the study of all insects harmful to agricultural products and the means of controlling such pests. He has been the author and co-author of thirty different papers dealing with injurious insects and their control.

The three insects referred to above and how to control them are discussed in the following pages in a popular fashion in answer to the questions - What are they? What do they look like? Where are they found? When are they found? How to control them.

BLISTER BEETLES

What are they?

The destructive species of blister beetles are all native insects. In their larval stages they feed on the eggs of grasshoppers and thus are useful in destroying many of these pests. However, this good is overbalanced later when the adult beetles feed on the flowers and foliage of cultivated plants. They seriously damage truck crops, flowering plants and weeds. They attack plants such as alfalfa, clover, flax, bean, beet, cabbage, potato, corn, onion, pea, Swiss chard, soybean, tomato, aster, calendula, chrysanthemum, clematis, larkspur, clover and many other plants.

What do they look like?

Adult blister beetles range in size from 1/3 to 3/4 of an inch. They are elongated insects with the primary body divisions of head, thorax and abdomen well defined. The antennae and legs are long and slender. The predominate colors among the injurious species are black and grey. Some of the western species are deep metallic blue, others metallic purple. The ground color of the striped blister beetle is a reddish yellow which is overlaid with two or three broad black bars. The margined blister beetle has the inner and outer edges of the deep black wings bordered with grey.

Where are they found?

These insects are found all over the United States.

When are they found?

The adults appear as early as the first of June and continue until the first of August depending on the species and locality.

How to control them.

Extensive laboratory experiments at the Ohio and the Indiana Agricultural Experiment Stations indicate that barium fluosilicate, used as a dust, is safe to foliage and a satisfactory and cheap control for blister beetles. One part of barium fluosilicate is mixed with four parts flour by weight. This dust does not tend to drift and it sticks to plants. Experiments in Ohio and Indiana proved that thirty to fifty pounds of the mixture per acre was almost 100 percent effective in the control of the striped, margined and black blister beetle.

MEXICAN BEAN BEETLE

What is it?

The Mexican bean beetle is a member of the ladybird beetle family. Of the newer insects that have invaded the United States, it is one of the most destructive. It feeds on the leaves and developing fruits of garden beans, such as the snap and lima. It cuts irregular holes through the leaves leaving portions of the upper surfaces and the larger veins untouched. Much of the leaf tissue is left in such a state as to resemble a network of veins. The plump yellow larvae are more destructive than adults. Two to three broods usually occur.

What does it look like?

The adult Mexican bean beetle is a copper-colored, almost hemispherical-shaped insect and is about one-fourth inch in length and one-fifth inch wide. It has sixteen black spots on its back and bears resemblance to some of the native beneficial ladybird beetles.

Where is it found?

It is found in New Mexico, Arizona, Colorado, Wyoming, Utah, Western Texas, Western Nebraska and in all states east of Illinois except Maine, New Hampshire, Vermont and Florida.

When is it found?

The pest makes its appearance in the settled warm days of spring when the adult beetles leave their winter quarters, which is usually about the time the earliest planted beans are coming into bloom.

How to control it.

While magnesium arsenate and calcium arsenate have been used because of greater adhesivity, it has been found that barium fluosilicate, especially in dust form, could be used with greater safety to plants. The lack of adhesivity in barium fluosilicate is overcome by mixing four parts of cheap flour with one part of barium fluosilicate. This should be applied before the bean pods are set and starting to increase in size. All dusting and spraying should be done with equipment which will insure thorough covering of the undersides of the leaves.

STRIPED CUCUMBER BEETLE

What is it?

The feeding of the striped cucumber beetle in both its young and adult stages is not only the cause of injury to good plants but the adults harbor in their intestinal tracts bacteria of a most serious plant disease, known as bacterial wilt or melon wilt.

What does it look like?

There are four stages in the life cycle of this pest; the eggs, larvae, pupae (resting stage), and the adult beetles. The larvae are slender white wormlike creatures about 1/3 inch in length. The head and posterior ends are brown. The adults are small, black-striped, yellow beetles.

Where is it found?

These beetles are found in any part of the United States east of the Rockies, where their favorite food plants, cucumbers, muskmelons and squashes are grown.

When is it found?

The pest makes its appearance with the arrival of the first warm days of spring. They feed on such fruits as apples, haws and mock orange until the cucumbers and melons are ready to push through the ground.

How to control them.

Barium fluosilicate has been used successfully in combating the striped cucumber beetle. S. Marcovitch of the Tennessee Agricultural Experiment Station has called attention to the effectiveness of this dust not only in controlling cucumber beetles, but also other members of the same family of insects. Other workers have verified his results. The best material that has been devised is a dust composed of one part of barium fluosilicate and four parts of cheap flour and applied at the rate of thirty pounds per acre. Dusting should be begun before the plants come above the ground in order to forestall the beetles going into the ground after them, and should be continued at weekly intervals until the pickles or melons form. Heavy applications of this dust are unnecessary. Light even applications well distributed over vines are effective. Extra applications should be made after heavy rains.

CORN EAR-WORM CONTROL

Growers are preparing to wage chemical warfare on the corn ear-worm in order to reduce to a minimum the great annual loss of sweet corn and field corn by this most destructive of corn pests.

The new method of combating the corn ear-worm gives promise of being of the greatest possible economic value to sweet corn growers. It consists of dusting the corn silk with barium fluosilicate (one part barium fluosilicate - one part flour) to destroy the newly-hatched broods of ear-worms. Dusting should start as soon as the first silk appears. Some injury may result if this dust reaches the leaves of the corn plant. This injury is not considered serious for the plant soon outgrows it.

A double purpose is fulfilled by killing the worms at the start, for says the U. S. Department of Agriculture: "The indirect injury to the ears which results from the work of the ear-worm is sometimes as important as the direct loss. Molds which would not otherwise gain entrance to the ears, are carried in by the worms, or enter with the rain through holes in the husk bored by ear-worms or at the tip where silks severed by the worms have fallen out.

"Other insects, such as the grain beetles and weevils, which are unable to penetrate sound, long, tight husks, often gain admission to the ears through husks or silks injured by ear-worms."

That barium fluosilicate will kill the corn ear-worm was the highly important discovery made by entomologists and agricultural experimenters working in two central west states. It is worthy of note that in Florida, where the growing of sweet corn is almost impossible because of the corn ear-worm, the number of clean ears of sweet corn harvested was increased from ten percent to 95 percent clean ears by the use of barium fluosilicate.

Note:- Barium fluosilicate is manufactured by The Grasselli Chemical Co. of Cleveland, Ohio, and sold under the trade name of "Dutox."

SUMMER CARE OF ROSES

Rose lovers are now starting to wage their annual war against plant diseases and destructive pests which cause so much damage during the summer months. Brown canker, mildew, black spot, and leaf-eating insects are now making their appearance.

Black spot, which is undoubtedly the most destructive of rose diseases, affects almost all varieties. Black circular spots appear on the leaves, which turn yellow and drop off. Vitality of the plant is weakened and often winter killing results.

Brown canker attacks the canes of roses and appears as reddish, circular spots which frequently girdle the cane, causing death of distal portions.

Mildew causes grayish white spots to appear on leaves, shoots and buds, resulting in stunted growth and malformed buds.

Numerous studies for the control of plant diseases and destructive pests have been made from time to time and many mixtures are now available. One of the most recent is a chemical dust made of manganese arsenate and other materials, which is at once a fungicide and insecticide. Exhaustive tests are said to have shown the high efficiency of the dust in the control of black spot, brown canker and mildew, and also most leaf-eating insects and the red spider as well, without deposits of prominent residues on the foliage or flowers.

This chemical dust is also said to be effective as a control for fungous diseases and most leaf-eating insects on other flowers.

One of the necessary points to be remembered, however, in the successful combating of diseases, is the collecting and burning of all dead leaves which fall to the ground. No diseased leaves should be allowed to remain in the rose beds.

NOTE:- Manganese arsenate is a development of the Grasselli Chemical Co., Cleveland, Ohio.

Manganese arsenate is contained in the product known as "Floragard," manufactured by the Grasselli Chemical Co. It is efficient not only for roses but for snap dragons, asters, carnations and hollyhocks.

THE STIMULATIVE EFFECT ON PLANTS OF MANGANESE COMPOUNDS

BY: E. B. Alvord, Manager,
New Products Division,
Grasselli Chemical Co.,
Cleveland, Ohio.

Growth and other normal functions of plants are stimulated by manganese compounds. This fact, although variable for different plants and under different soil and climatic conditions, has been known for some few years and now has become of significant commercial importance.

Research over a period of years by the United States Bureau of Chemistry in Soils indicates that manganese is an essential plant food element. Without manganese, according to a Federal Report, plants show an abnormal growth or other symptoms, which are quite similar to disease conditions.

Most soils contain sufficient manganese for crop production, but in certain sections where manganese is rare or totally lacking, or under conditions in which manganese is not available to plants, serious difficulties are usually experienced. This evidence of manganese deficiency shows up under greenhouse conditions as well as field conditions. Lack of manganese causes plants to lose their normal ability to produce sugar and starch (essential plant foods) by the synthesis of chlorophyl. Young leaves and branches under these conditions do not attain normal growth or color and eventually die. If manganese is made available, however, plants regain their normal growth and color.

Yields on a variety of crops have been increased under manganese feeding. Corn, lettuce, beans, onions, cucumbers, tomatoes, potatoes, tobacco, oranges, have shown excellent responses to manganese feeding. Remarkable yields of tomatoes have occurred on calcareous soils in Florida when Manganar is applied. Plants growing in alkaline soils generally respond most favorably to available manganese. Manganese sulphate has been the chief practical source of manganese for plants.

Continued on next page

Other methods of supplying manganese to plants will undoubtedly be developed. Experiments indicate that some plants are capable of assimilating manganese through the leaves as well as through the roots. This fact has caused increased interest in a new manganese arsenate compound which has lately been introduced as an insecticide to replace lead arsenate or calcium arsenate on fruits and certain vegetables.

Preliminary indications under field conditions are that the manganese in manganese arsenate is available to certain plants and that these plants absorb or assimilate the manganese through the leaf stomata, when the material is applied as an insecticide. An experimenter in California reported that Gravenstein apples sprayed with manganese arsenate attained a higher degree of color than trees of the same variety sprayed with other standard materials.

Certain plots of cucumbers and potatoes under experiment in Ohio during 1933 received applications of manganese arsenate as an insecticide. Experimenters noted that those plants receiving the manganese compound had a thriftier, healthier appearance and were of a deeper green than were plants grown under the same conditions which had not received the manganese application. At the end of the growing season, yields of potatoes were favorable in the manganese plots and the total length of vine and total weight of cucumbers in the cucumber experiments were in favor of those plots receiving applications of manganese arsenate.

Manganese arsenate is available commercially. This product is produced by the Grasselli Chemical Co. of Cleveland, Ohio, in this country. It is being used commercially as a substitute for lead arsenate and calcium arsenate on apples and pears, on certain vegetables, and on floral crops.

The manufacturers of manganese arsenate state that they are not making any definite claims for manganese arsenate as a source of manganese for plants, but preliminary trials seem to indicate that the manganese in this compound is available to plants. Further experiments are being conducted in an attempt to substantiate this indicated property of manganese arsenate.

Manganese arsenate may have identical possibilities on other crops as those indicated on potatoes and cucumbers. If future experiments bear this fact out a new source of manganese, as well as an effective insecticide, will be available to growers.

FUMIGATION OF GREENHOUSES

Fumigation with Hydrocyanic Acid Gas (HCN) for the control of destructive pests has been practiced for almost 50 years. In 1917 the Bureau of Entomology, U. S. Department of Agriculture, investigated the use of HCN Gas for greenhouse fumigation and issued Bulletin No. 513, "Fumigation of Ornamental Greenhouse Plants with Hydrocyanic Acid Gas," by E. R. Sasscer and A. D. Borden, giving instructions for the correct use of this gas. This bulletin forms the basis of modern fumigation practice, although additional information has been published in more recent bulletins.

Best results are obtained by fumigating when conditions are most favorable. The greenhouse must be made as tight as possible to prevent the escape of the fumigation gas. The best temperature for fumigation is between 55° and 68° F. The fumigation should be conducted not earlier than one hour after sunset, and should not be attempted when the wind is high.

The average gas concentration for greenhouse fumigation is approximately one half ounce of Hydrocyanic Acid Gas per thousand cubic feet of space. However, higher strengths are employed for the control of insects on a number of plants. Most greenhouse men prefer to fumigate three or four times at short intervals with a low dosage, rather than to have one fumigation with high dosage. Best results are obtained if the exposures do not exceed one hour; in most cases an exposure of twenty minutes is sufficient.

In using HCN Gas it must be remembered that this gas is poisonous, and due precautions must be taken both during and following the fumigation. No one can enter the greenhouse during the fumigation period or following it until after the house has been thoroughly ventilated.

NOTE:- The most economical source of Hydrocyanic Acid Gas is CYANEGG (Du Pont Sodium Cyanide - minimum strength, 96%), manufactured by The R. and H. Chemicals Department of the du Pont Company. This department will be glad to supply specific details on the generation of HCN Gas from CYANEGG for the fumigation of greenhouses.

SORGHUMS IN YEARS OF DROUGHT

In years of drought, growers invariably increase their acreage of sorghums. It is known that most varieties of sorghum seed readily rot and fail to produce a stand if a heavy rain follows planting. In order to off-set this rotting, it is the usual practice to sow more seed than is necessary to produce a satisfactory stand under normal moisture conditions. Also, sorghums are handicapped by a fungous disease known as kernel smut which reduces the yield and suitability of the grain for feeding to live stock.

Federal and state experimental work on sorghum seed treatment shows how the kernel smut can be controlled. Experiments have shown that kernel smut in sorghums can be controlled by the use of fungicide dusts, among them Ceresan. A reference to this is made in the Yearbook of Agriculture 1933. Again in the United States Department of Agriculture Farmers' Bulletin No. 1631, reference is made to the fact that Ceresan will completely control the covered kernel smut of broomcorn. The Texas Agricultural Experiment Station in its 41st Annual Report refers to the fact that Feterita seed treated, among other things with Semesan, germinated better in the field than untreated seed. A reference to similar experiments is made in Panhandle Bulletin No. 5, issued by the Panhandle Agricultural and Mechanical College, Goodwell, Okla.

Note: - Semesan and Ceresan are products of the Bayer-Semesan Co., Wilmington, Del.